



METAL FINISHING TECHNOLOGIES, LLC

Finishing Work Force Pipeline Initiative *Connecticut Readiness*

Speaker Ritter's Office
13-December- 2022
Peter Mirabello

For More information contact:
us at www.mftech.com

METAL FINISHING

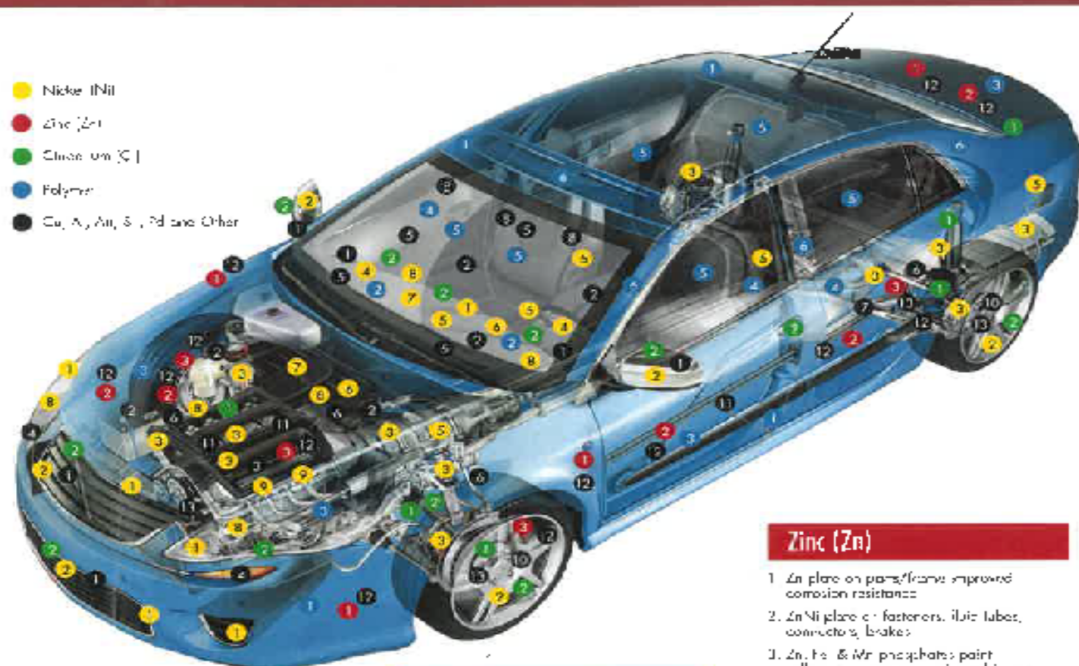
SUMMARY MARKET STATUS

- **1) Ct Metal Finishing is facing the same workforce headwinds others in the state and nation. Our coalition is providing a solution to address that challenge and open a viable and stable career path**
- **2) Metal Finishing is especially challenged as it is not being taught in high schools or technical schools. Yet it's a direct line into mfg that will help ensure next generation CT workforce continues to grow.**
- **3) As importantly Metal Finishing is and will remain a critical link in the manufacturing supply chain regionally and nationally. It supports all major industries. Its need is not going away. On top of that the skills are highly transferable.**

Finishing examples of what's next:
Evolution of Aerospace efficiency & Electric Battery Tech

- To make aircraft fly faster, farther and with more payload, the goal is to lighten the aircraft. Done by using lighter base materials.
- Those new materials need to be finished, (coated) to have new material perform like the older heavier materials. That's what finishing does.
- For example;
- Hydrogen, a next gen fuel source, produce internal steam leading to corrosion. New high temp coatings will be applied to protect the motor
- Finishing will also be critical to the evolving Electric Battery market to ensure better energy storage, life of the battery, and consumer safety.
- These is a long list of other industry's such as medical, marine, automotive, electronic, industrial and household appliances where this technology and skill is critical now and in the future.

Two of many examples of how integral and critical finishing is to the manufacturing in CT. And it will only grow into next generation of automobiles, aircraft, helicopters, drones, EV's, medical devices, space vehicles, weapon systems, etc.



Polymer

1. External paint system
2. Paints on all dashboard gauges, trim, controls
3. Aluminum alloy lifeline dipswitch fastener coatings
4. Lubricious polymer coatings on window edges
5. Fabric and leather coatings - egg and fish, stains, bacteria, water, static shoes
6. Eco-friendly event car frame coatings

The National Association
for Surface Finishing

National Press Building
529 14th Street NW, Suite 1280
Washington D.C. 20045
Ph: (202) 591-2454

NASF.org

Nickel (Ni)

1. Electroless Ni for plating on alloys
2. Ni plate under decorative chrome
3. Electroless Ni for wear, corrosion - pistons, suspension, brake systems, fuel lines, gears
4. Ni for decorative trim
5. Ni plated magnesium for tension weight
6. Electroless Ni to do chrome without chrome
7. Ni plating for electronic circuit substrates
8. Electroless Ni/Pd/Au for wire bond, fluxless soldering
9. Electroless Ni-PTFE for fuel injectors

Chromium (Cr)

1. Hard Cr on valve stems, shocks, brake cylinders, fuel injection nozzles
2. Decorative Cr on interior and exterior trim, wheels, knobs, fasteners

Zinc (Zn)

1. Zn plate on parts/frame improved corrosion resistance
2. Zn/Ni plate on fasteners, fluid tubes, connectors, brakes
3. Zn, Fe & Mn phosphate paint adhesion, corrosion and break-in wear

Cu, Al, Au, Sn, Pd and Other

1. Copper under decorative coatings, wire bonds
2. Gold, silver, tin on electrical contacts
3. Stainless-like coatings on fuel injectors
4. Aluminum alloy reflectors
5. Hydrophobic coating for "water" internal trim
6. Nitrocarbide for wear components
7. Platinum, palladium, rhodium for catalytic converters to reduce pollution
8. Optical coatings on lenses, smart glass
9. Thin aluminum, Cr for corrosion
10. Powder coating for wheels
11. Anodizing - pistons, rings, seat slides
12. Conversion coatings on Zn, Zn/Ni, steel
13. Tin alloy coatings for bearings

If every nickel use on the illustration were properly marked, the aircraft could not be seen.



OEM Coating

1. Ni plate under Cd on Al electrical connectors throughout - thousands
2. Electroless Ni-PTFE and Zn/Ni replating Cd on connectors
3. Ni plate under gold plate on all connector pins - thousands
4. Ni on engine oil tanks
5. Ni alloy on Ni plated oil tubes
6. Zn/Ni plating for corrosion protection
7. Ni plated Cu wiring for corrosion protection
8. Electroless Ni on bearings for wear
9. Ni/Cr/V on turbine blades to bond TBC
10. Electroless Ni and electroplated Ni on critical rotating parts and shafts to prevent corrosion

Repair Coating

1. Stainless steel thermal spray
2. Inconel thermal spray
3. Zn/Ni plating for repair
4. Electroless Ni and electroplated Ni on oil rotating parts and shafts for wear and corrosion
5. Replate for repair
6. Sulfonate Ni for landing gear repair
7. Rod repair on engine everywhere

Alloy

1. Ni alloy on Ni clad pilot tube
2. Inconel on bearing inner races
3. Gear steel 17-1PH
4. 300M high strength steel with Ni
5. PH Stainless steel actuator rods
6. Stainless steel sensors
7. Hydraulic pumps, valves
8. Stainless steel hydraulic tubing
9. Fasteners 4340 steel everywhere

"Green" Coating

1. Electroless Ni-PTFE and Zn/Ni replating Cd on connectors
2. Stainless steel thermal spray
3. Zn/Ni plating for corrosion protection
4. Zn/Ni plating for repair
5. Electroless Ni and electroplated Ni on critical rotating parts and shafts for wear and corrosion
6. Replate for repair
7. Zn/Ni on bearings for corrosion
8. EN for wear and corrosion - hundreds
9. Electroless Ni for air internals
10. Zn/Ni plate replating Cd on exhausts
11. Electroless Ni internal bearings
12. Zn/Ni plated fasteners

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REGIONAL SECTOR

COALITION TEAM



Uni Metal
MFT, LLC

Summit Plating
HAR CONN

Waterbury Plating

Pape Plating

Bass Electro Plating

AEF

Hubbard Hall

MacDermid



Better results.
Less chemistry.™



Overview:

1) CHALLENGE: A significant amount of Connecticut finishing work gets shipped out of state - due to shortages of quality certified suppliers and a skilled workforce to meet the need.

Yet finishing remains critical to the supply chains of Raytheon, Lockheed Martin, General Dynamics, as well as GE, RR, the automotive industry, medical, marine and the industrial markets. And to Connecticut's readiness and competitiveness

Further the demand for finishing in the state and nation ***will only increase*** with the arrival of drones, EV's, next generation aircraft, medical, commercial, marine, motorcycles, household goods and evolving material sciences, etc.



- **2) OPPORTUNITY NEED:** Our coalition can provide an industry leading pipeline of a well-prepared finishing candidates – in CT.
- **3) CHARTER SOLUTION:** turn the need into an innovative, viable and rewarding career path.
 - **TEACHING APPROACH:** combines the science, technology and the environment. *Historically only science was contemplated and taught.*
 - **GREEN EVOLUTION:** Industry is based on the periodic table, the list of all known elements the earth provides. It is critical to teaching using these elements in both an efficient manner and with an eye towards the environment. Green Global Thinking
 - **FORWARD THINKING INNOVATION** – finding efficient, greener uses of our resources and technology that will drive the future



ACROSS THE BOARD SOLUTION BENEFIT

The Company Benefit:

Provides viable candidates with industry awareness and a guided hands-on familiarity upfront

This eliminates the normal 30-60-90 days of trial to then only have fall out

Reduces the cost of training and the higher turnover rate for entry level employees

The Employee Benefit:

Successful Candidates can Add value Day 1 - and earn better pay to start, **leading to family sustainable wages**

Opens a career and career path that overtime can lead to other key functional needed areas such as:

Quality Engineer

Process Engineer

Technical Sales

Team Lead

Department Head

Maintenance Director

The State's Benefit: Jobs and Infrastructure

Critically strengthens in Ct all major industries while expanding the Ct tax-payer base

STATE BENEFIT SIZING: AREA REGISTERED PLATING FINISHERS IN THE AREA

Anodic Incorporated	Stevenson	CT	06491-0052	Stevenson	CT	Plating Polishing	Finishing, Metals Or Formed Products
Bass Plating Company	Bloomfield	CT	06002-1417	Bloomfield	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Etherington Brothers Inc	Bristol	CT	06010-4699	Bristol	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Jarvis Precision Polishing	Bristol	CT	06010-7491	Bristol	CT	Plating Polishing	Electroplating And Plating
B & P Plating Equipment LLC	Bristol	CT	06010-7736	Bristol	CT	Plating Polishing	Plating Of Metals Or Formed Products
Scotts Metal Finishing LLC	Bristol	CT	06011-9091	Bristol	CT	Plating Polishing	Finishing, Metals Or Formed Products
Baron & Young Co Inc	Bristol	CT	06010-8405	Bristol	CT	Plating Polishing	Buffing For The Trade
Deburring House Inc	East Berlin	CT	06023-1032	East Berlin	CT	Plating Polishing	Buffing For The Trade
National Integrated Inds Inc	Waterbury	CT	06704-0129	Farmington	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
J H Metal Finishing Inc	New Britain	CT	06051-1619	New Britain	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Marsam Metal Finishing Co	New Britain	CT	06050-1975	New Britain	CT	Plating Polishing	Plating Of Metals Or Formed Products
Rayco Inc	New Britain	CT	06051-2130	New Britain	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Seaboard Metal Finishing Co	New Britain	CT	06051-2910	New Britain	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
K & K Black Oxide LLC	New Britain	CT	06050-1856	New Britain	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Alpha Plating and Finishing Co	Plainville	CT	06062-0089	Plainville	CT	Plating Polishing	Plating Of Metals Or Formed Products
Plainville Plating Company Inc	Plainville	CT	06062-0219	Plainville	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Accurate Burring Company	Plainville	CT	06062-2368	Plainville	CT	Plating Polishing	Finishing, Metals Or Formed Products
Precision Plating Corp	Vernon Rockville	CT	06066-0506	Vernon	CT	Plating Polishing	Buffing For The Trade
Allied Metal Finishing L L C	South Windsor	CT	06074-0026	South Windsor	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Quality Deburring Inc	South Windsor	CT	06074-4104	South Windsor	CT	Plating Polishing	Buffing For The Trade
Ddm Metal Finishing Company	Tolland	CT	06084-0687	Tolland	CT	Plating Polishing	Buffing For The Trade
Sifco Applied Srfc Cncepts LLC	East Windsor	CT	06088-9616	East Windsor	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Arrow Space Deburring	Windsor	CT	06095-1338	Windsor	CT	Plating Polishing	Cleaning, Polishing, And Finishing
Precision Finishing Svcs Inc	North Granby	CT	06060-0189	Windsor	CT	Plating Polishing	Plating Of Metals Or Formed Products
New England Chrome Plating	East Hartford	CT	06108-2056	East Hartford	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Har-Conn Chrome Company	West Hartford	CT	06133-0189	West Hartford	CT	Plating Polishing	Plating Of Metals Or Formed Products
Component Technologies Inc	Newington	CT	06111-1708	Newington	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
A-1 Chrome and Polishing Corp	Newington	CT	06111-3619	Newington	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
HI-Tech Polishing Inc	Newington	CT	06111-5547	Newington	CT	Plating Polishing	Tumbling (cleaning And Polishing) Of Machine Parts
Plainville Electro Plating Co	Hartford	CT	06117-1112	Hartford	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Hitech Chrome Pltg & Polsg Lc	North Windham	CT	06256-0204	North Windham	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
National Chromium Company Inc	Putnam	CT	06260-1039	Putnam	CT	Plating Polishing	Chromium Plating Of Metals Or Formed Products
Prestige Metal Finishing LLC	Eastford	CT	06242-0097	Woodstock Valley	CT	Plating Polishing	Plating Of Metals Or Formed Products
Country Creations by Carol	Uncasville	CT	06382-2301	Uncasville	CT	Plating Polishing	Decorative Plating And Finishing Of Formed Products
Crc Chrome Corporation	Meriden	CT	06450-4250	Meriden	CT	Plating Polishing	Chromium Plating Of Metals Or Formed Products
J M Compounds Inc	Meriden	CT	06450-8603	Meriden	CT	Plating Polishing	Buffing For The Trade

Bar Plating Inc	Meriden	CT	06451-5589	Meriden	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Rayco Metal Finishing Inc	Middletown	CT	06457-0177	Middletown	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Deburr Co	Plantsville	CT	06479-0024	Plantsville	CT	Plating Polishing	Finishing, Metals Or Formed Products
Chromalloy Component Svcs Inc	Shelton	CT	06484-3166	Shelton	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Light Metals Coloring Co Inc	Southington	CT	06489-1589	Southington	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Concept Team Associates LLC	Wallingford	CT	06492-2257	Wallingford	CT	Plating Polishing	Plating Of Metals Or Formed Products
Broad Peak Manufacturing LLC	Wallingford	CT	06492-2455	Wallingford	CT	Plating Polishing	Cleaning, Polishing, And Finishing
Custom Chrome Plating	Wallingford	CT	06492-4500	Wallingford	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Technical Metal Finishing Inc	Wallingford	CT	06492-5818	Wallingford	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Color Ite Refinishing Co	Bethany	CT	06524-3121	Bethany	CT	Plating Polishing	Plating And Polishing
Reliable Plating & Polsg Co	Bridgeport	CT	06607-1541	Bridgeport	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Spec Plating Inc	Bridgeport	CT	06607-1606	Bridgeport	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Connecticut Anodizing Finshg	Bridgeport	CT	06607-1930	Bridgeport	CT	Plating Polishing	Finishing, Metals Or Formed Products
American Fnshg Specialists Inc	Bridgeport	CT	06607-2101	Bridgeport	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Lake Grinding Company	Bridgeport	CT	06610-2103	Bridgeport	CT	Plating Polishing	Finishing, Metals Or Formed Products
USC Technologies LLC	Stratford	CT	06615-7103	Stratford	CT	Plating Polishing	Electroplating And Plating
E & J Parts Cleaning Inc	Waterbury	CT	06704-0250	Waterbury	CT	Plating Polishing	Cleaning And Descaling Metal Products
Seidel Inc	Waterbury	CT	06704-0727	Waterbury	CT	Plating Polishing	Polishing, Metals Or Formed Products
American Electro Products Inc	Waterbury	CT	06704-0129	Waterbury	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Nylo Metal Finishing LLC	Waterbury	CT	06704-0960	Waterbury	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Mirror Polishing & Pltg Co Inc	Waterbury	CT	06708-1430	Waterbury	CT	Plating Polishing	Chromium Plating Of Metals Or Formed Products
Halco Inc	Waterbury	CT	06723-2545	Waterbury	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Clear & Colored Coatings LLC	Wolcott	CT	06716-2622	Wolcott	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Unimetal Surface Finishing LLC	Naugatuck	CT	06770-1187	Naugatuck	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Anomatic Corporation	Naugatuck	CT	06770-2254	Naugatuck	CT	Plating Polishing	Anodizing (plating) Of Metals Or Formed Products
A&R Plating Services LLC	Oakville	CT	06779-1578	Oakville	CT	Plating Polishing	Plating Of Metals Or Formed Products
Quality Rolling Deburring Inc	Thomaston	CT	06787-0128	Thomaston	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Summit Corporation Of America	Thomaston	CT	06787-2098	Thomaston	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Whyco Finishing Tech LLC	Thomaston	CT	06787-2099	Thomaston	CT	Plating Polishing	Plating Of Metals Or Formed Products
Uprising LLC	Torrington	CT	06790-3489	Torrington	CT	Plating Polishing	Cleaning, Polishing, And Finishing
Gar Electro Forming	Danbury	CT	06810-4131	Danbury	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Danbury Metal Finishing Inc	Danbury	CT	06813-1175	Danbury	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Eds Perfect Polishing	Fairfield	CT	06824-6485	Fairfield	CT	Plating Polishing	Polishing, Metals Or Formed Products
Silversmith Inc	Greenwich	CT	06830-6215	Greenwich	CT	Plating Polishing	Polishing, Metals Or Formed Products
Superior Plating Company	Southport	CT	06890-1241	Southport	CT	Plating Polishing	Electroplating Of Metals Or Formed Products
Smart Polishing	Stamford	CT	06902-6465	Stamford	CT	Plating Polishing	Polishing, Metals Or Formed Products

AEROSPACE

The Finishing Career Path

Finishing and New Aircraft Build -OEM

- 1) The goal of aircraft and space craft design is always look to reduce weight
- 2) This extends aircraft range, pay load, cuts costs, increases speed
- 3) Weight reduction is achieved by using new, lighter materials
- 4) An electro-chemical layer can be added to the new base materials
- 5) This coating allows lighter materials to perform like the heavier metals
- 6) Material technology and its application is key to the future of aircraft, EV's, batteries, drones, weapons, space systems, etc.

Finishing in Overhaul Business - MRO

- 1) After years of flying, the coatings can be chemically removed
- 2) It can be done without attacking the base metal – bring back original form
- 3) The part is then inspected and, in many instances, repaired and recoated
- 4) Part life is extended
- 5) Reduces earth mining for more material
- 6) Helps the environmental
- 7) Drives down life cycle operating costs

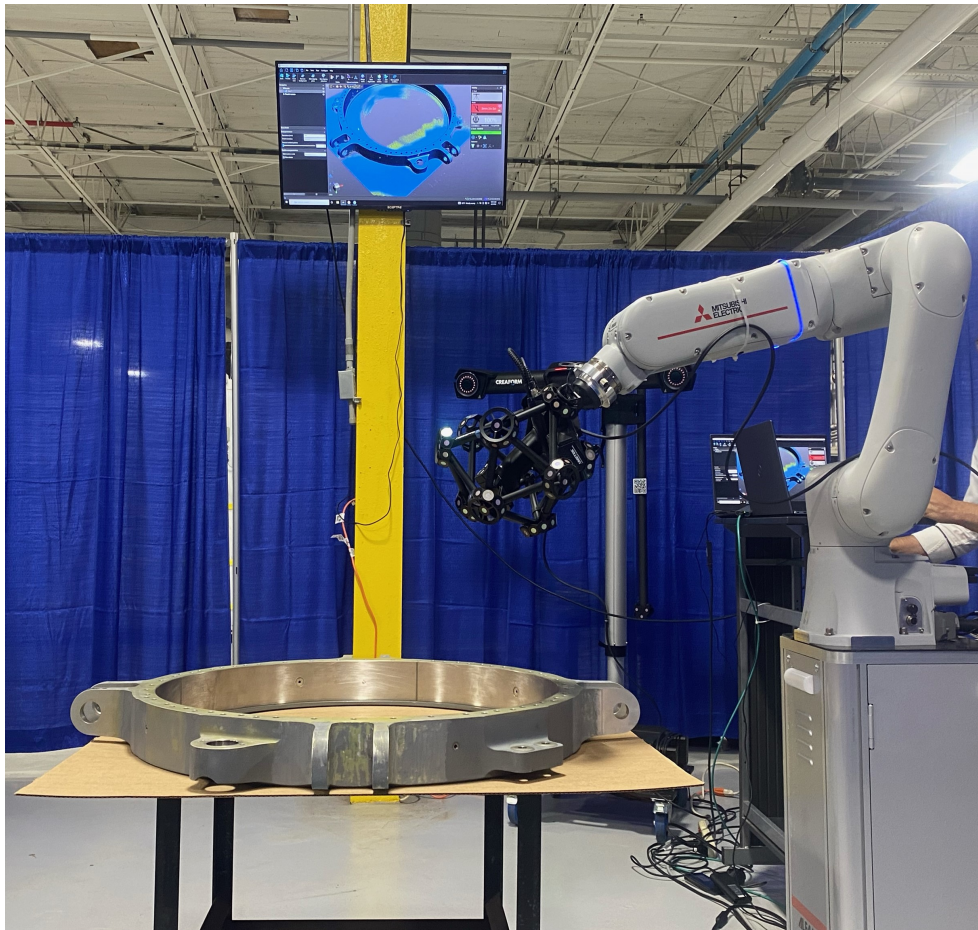


Model Based Inspection

Factory 4.0 Digital Career Path

OVERVIEW: The goal of competitive MRO is to **reduce down time and extend part life.**

The MFT and CCAT Technology partnership supports both



Once the aero-coating is removed, the part is back to its original form. The part can now be digitally inspected, meaning millions of data points are quickly and organized in a searchable machine learning part

The Process:

- 1) Condition the CAD Model – to identify critical features to inspect
- 2) Digitally scan part - gather millions of data points in minutes
- 3) Overlay the scan on CAD Model - yield feature deviation map
- 4) Valuable performance feedback - gathered and shared in minutes
- 5) Performance Trends – key parts of digital lifetime thread
 - Drives Design Mod's to extend part life
 - Base life decision based on actual flying conditions
 - Compress repair decisions time
- 6) Reduces both lifetime operating \$\$ costs and environmental impact

TRAINING GROWTH MATRIX

	Prod Technician 1			Prod Technician 2			Prod Technician 3			Administrative		
Skills Matrix	Clean	Mask	Stage	Qualified Cell 2	Qualified Cell 3	Qualified Cell 4	DSQR	Inspect FAA	CP Cert	Schedule	Customer	Routers
Employee 1	3	3	3	3	3	3	3	3	3	3	1	3
Employee 2	3	3	3	3	3	3	3	3	3	3	1	3
Employee 3	2	2	2	3	3	3	3	3	3	0	0	0
Employee 4	1	1	1	0	0	0	0	0	0	0	0	0

Example Categories

- 1) Basic Chemistry for Electro Platers
Amperage, Bars, Concentration
- 2) Preparing Metals for Plating
Acids and Activation
- 3) Barrel and Rack Plating Technology
Understanding Titration
- 4) Optimizing Rinsing
- 5) Need for filtration, agitation and purification
- 6) The Use of Hull Cells to trouble shoot
Part QC

- 7) Commonly Plated Alloys
- 8) Difference between Anodizing & Plating
- 9) Common Finishes and their effect
Zinc
E/N
Cadmium
Chrome
Silver
Passivate
- 10) Glossary

ADDITIONAL TRAINING
 OSHA 10
 LEAN
 Financial Wellness

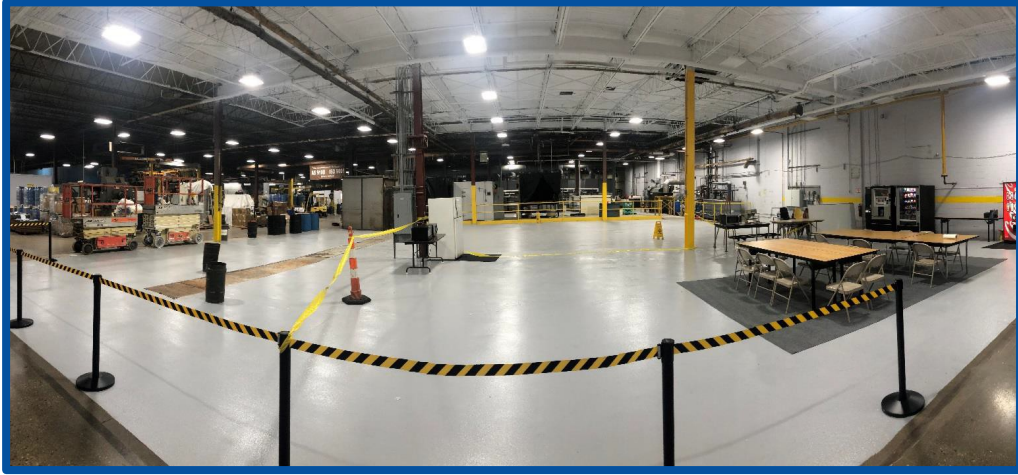
The EFFECTIVE Training Status



- There is no school-based curriculum or the lab space essential to the training. We will provide both.
- Which will provide students with:
- Subject knowledge, industry exposure, mkt access and credentials.
- *LEADING TO HIGH PAYING ADVANCE MANUFACTURING JOBS, WITH CONNECTICUT STUDENTS AT THE FOREFRONT.*
- Further it positions the state to be a leader in this space, nationally. (We have been approached by other states and college systems about moving this effort to their state).

- **Missing piece is the laboratory space for the critical hands-on demonstration and training, which MFT is willing to provide. The space to teach the fundamentals of the industry. And pioneer new technologies and applications.**
- It will foster students becoming THOUGHT LEADERS and effective finishers and environmental stewards

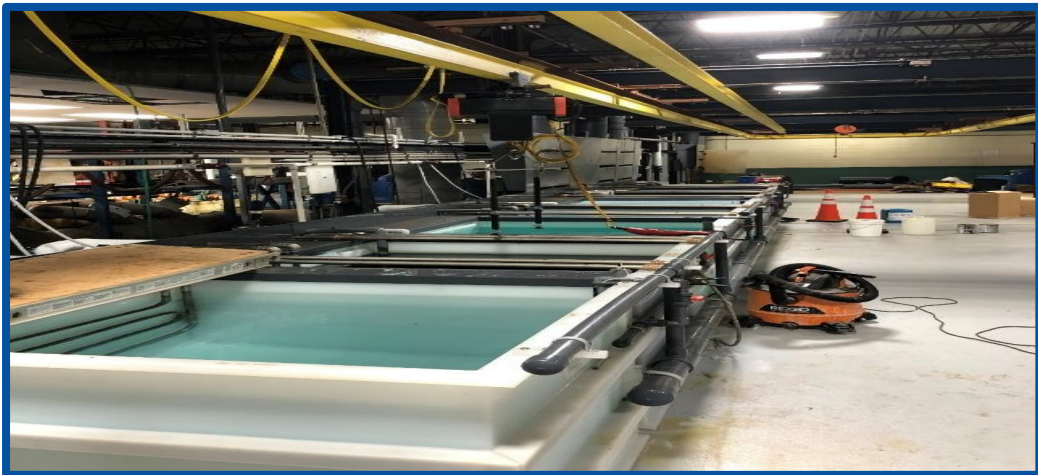
Facilities & Equipment



Digital & Technology Growth Footprint



NADCAP LAB – Consistent Chemical Integrity



NADCAP Nickel Plating Line



Virtual Meeting Room



These are just a few of the industries in which finishing is a critical and vulnerable part of the future supply chain.

This effort will help position the Connecticut workforce nationwide within the industry.



APPENDIX

REGIONAL SECTOR

MacDermid Support Letter



MacDermid Enthone
INDUSTRIAL SOLUTIONS

MacDermid, Inc
245 Freight Street, Waterbury, CT 06702 USA

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macdermidenthone.com/industrial

11/3/22

Skip Griffin
VP Operations
Metal Finishing Technologies
60 Wooster Ct.
Bristol, CT 06010

Dear Skip:

Thanks for reaching out regarding MFT's metal finishing educational initiative. Like many others, the metal finishing industry is experiencing a severe shortage of new, young talent and MacDermid Enthone believes that this initiative is a significant step in the right direction to secure the future of our industry and has our full support. We believe this program has the potential to produce a steady stream of qualified candidates that we would welcome the opportunity to hire. Additionally, this type of program could also result in savings to our company through reduced on-board training costs and increased productivity. In our CT-based facilities alone, I estimate this could result in 2-4 new hires per year at a minimum.

Please let me know what MacDermid Enthone can do as an organization to help support MFT and your program partners to take this to the next level.

Best regards,

Douglas Hughes

Douglas Hughes
Product Manager, Wear Resistant Coatings, North America
MacDermid Enthone Industrial Solutions